

What is claimed is;

1. An etching method for plasma-etching an SiO_2 film layer covering an SiN_x film layer formed at a workpiece placed inside an air-tight processing chamber by raising to plasma a processing gas induced into said processing chamber, wherein;

said processing gas is a mixed gas containing at least C_4F_8 and CH_2F_2 .

2. An etching method for plasma-etching an SiO_2 film layer covering an SiN_x film layer formed at a workpiece placed inside an air-tight processing chamber by raising to plasma a processing gas induced into said processing chamber, comprising;

a first step in which said SiO_2 film layer is etched by using a mixed gas containing at least C_4F_8 and CO as said processing gas; and

a second step in which a switch is made to a mixed gas containing at least C_4F_8 and CH_2F_2 to be used as said processing gas to etch said SiO_2 film layer immediately before said SiN_x film layer becomes exposed.

3. An etching method for plasma-etching an SiO_2 film layer covering an SiN_x film layer formed at a workpiece placed inside an air-tight processing chamber by raising to plasma a processing gas induced into said processing chamber, comprising;

a first step in which said SiO_2 film layer is etched by using a mixed gas containing at least C_4F_8 and CO as said processing gas; and

a second step in which a switch is made to a mixed gas containing at least C_4F_8 and CH_2F_2 to be used as said processing gas to etch said SiO_2 film layer immediately after said SiN_x film layer becomes exposed.

4. An etching method according to any of claims 1, 2 and 3, wherein;

the flow rate ratio ($\text{CH}_2\text{F}_2 / \text{C}_4\text{F}_8$) of C_4F_8 and CH_2F_2 in said mixed gas containing at least C_4F_8 and CH_2F_2 is set essentially within a range of $0.4 \sim 1.0$.

5. An etching method according to any of claims 1, 2 and 3, wherein;

the partial pressure corresponding to C_4F_8 relative to the entire pressure of said mixed gas containing at least C_4F_8 and CH_2F_2 is set essentially within a range of $0.4 \text{ (mTorr)} \sim 0.8 \text{ (mTorr)}$.

6. An etching method according to any of claims 1, 2 and 3, wherein;

the density of plasma excited inside said processing chamber is set essentially within a range of $1.5 \times 10^{10} \text{ (number of ions / cm}^3\text{)} \sim 1.2 \times 10^{11} \text{ (number of ions / cm}^3\text{)}$.

7. An etching method according to any of claims 1, 2 and 3, wherein;

said workpiece is placed on a mounting surface of a susceptor provided inside said processing chamber; and

the temperature of said susceptor is set essentially within a range of $20^\circ\text{C} \sim$ the heat resistance temperature of a photoresist layer constituting a mask pattern for said SiO_2 film layer.

8. An etching method according to any of claims 1, 2 and 3, wherein;

said mixed gas containing at least C₄F₈ and CH₂F₂ further contains an inert gas.

9. An etching method according to claim 2 or 3, wherein;
said mixed gas containing at least C₄F₈ and CO further contains an inert gas.